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NOTES
ON THE
PATHOLOGY

OF THE
Sympathetic Nervous System.

BY T. EDWARDS CLARK, M.D., PH.D.,
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NOTES ON THE PATHOLOGY

OF THE

SYMPATHETIC NERVOUS SYSTEM.*

SOME months ago we began investigating the action of alcohol on the sympathetic nervous system, and in our preparatory work we were surprised to find how little is *definitely* known in regard to the pathology of this part of the animal structure.

We have been induced to present, in the form of the paper of the evening, a portion of our notes made while reviewing this subject.

Before entering upon the pathology of the sympathetic, we ought, perhaps, to allude briefly to its functions as ascertained by experimenting on the lower animals. In 1727, M. Pourfour du Petit found that after section of the cervical sympathetic, the pupil became contracted, the cornea flattened, the conjunctiva hyperæmic, the eyelids partially closed, and the eye appeared smaller and was drawn backward into the orbit. Similar experiments have since been made by Claude Bernard, Waller, Budge, Schiff, Brown-Sequard and many other physiologists, who have added to the observations of Pourfour du Petit. They remarked that after section of the cervical sympathetic, besides the above phenomena, there was a more or less marked contraction of the nostril and of the mouth on the corresponding side, and an increase of the circulation of the blood, as well as of the temperature of the head; perspiration, lachrymation and the secretion of cerumen were also augmented.

* Read before the N. Y. Neurological Society, Nov. 1st, 1875.

Other physiological changes were observed, which, however, do not at present interest us; nor need we here allude to the action of galvanism on the sympathetic, but later we may have something to say in regard to experiments on other portions of the ganglionic system. The points which we would specially note in the observations of the above physiologists, are the effects of section or destruction of the cervical sympathetic on the iris, the condition of the blood-vessels, the perspiration and the temperature.

Our next step is to the pathology of the cervical sympathetic, and, though the carefully studied and recorded cases are but few, we find that those reported by American physicians are as interesting and instructive as any. There is a more or less doubtful feature in them all, which leaves our knowledge of this portion of the nervous system very far from definite. It is the cerebro-spinal system that interferes with the conclusiveness of our deductions.

We will here present the points of present interest in four cases reported by Drs. Ogle, Mitchell, Payne and Seguin.

Dr. Ogle's* patient had a hard lump on the right side of the neck, which suppurated and took many months to heal. Two years later, when first seen by Dr. Ogle, there was a punctured scar across the root of the neck on the right side; the right palpebral fissure was narrowed, the right pupil was much smaller than the other, the right conjunctiva was rather more congested than the left, the right ear was redder than the left, and the redness sometimes extended to the cheek. The right ear, the right nostril and the right side of the mouth were hotter than the corresponding parts on the left side of the face. These were the conditions when the man was at rest. When he took violent exercise the thermometric relations of the two sides were reversed; at the same time the left side of the face, head and neck sweated profusely. The Doctor supposes that the abscess had eaten through the cervical sympathetic.

One of the four or five recorded cases of supposed traumatic injury to the sympathetic of the neck, is recorded by Drs.

* *Lancet*, 1869, p. 461.

Mitchell,* Morehouse and Keen. The patient was a soldier, wounded at Chancellorsville. A ball entered his right neck, one and a half inches behind the ramus of the jaw, at the anterior edge of the sterno-cleido mastoid muscle. The ball passed across the neck, rising a little, and emerged immediately below, and a half inch in front of the angle of the jaw on the left side. The wound healed within six weeks. Some of the symptoms observed as effects of the injury were the following: The pupil of the right eye was very small, that of the left was unusually large. There was ptosis of the right eye, and its outer angle appeared as though it were dropped a little lower than its inner angle. The ball of the right eye looked smaller, and the conjunctiva was somewhat redder than that of the left. The patient complained a good deal of headache, and thought his memory was failing. After exercise his face was flushed on the right side and pale on the left, but no thermometric examination was made at such times. During repose there was no difference in the temperature of the two sides.

Dr. Payne's† case was a child fifteen months old, who presented a marked difference between the two sides of his face. The left was pale, the palpebral fissure narrow and a little sunken in the head, and the pupil was smaller than that of the right. The right eye watered, and there was a constant running from the right nostril. When from any cause the child flushed, it was the right side of the face that became red, while the left remained pale. Only the right side sweated under any circumstances. Dr. Payne concludes that the cervical sympathetic of the left side, in the present case, must have received, judging from the history, at birth an injury amounting to severance.

The case which Dr. Seguin‡ reported two or three years ago was a male, about fifty years of age, who had exhibited one-sided sweating of the face and neck for a considerable number of years, in which period the right half of the face and neck never showed any moisture, not even when the left side

* *Gunshot Wounds and other Injuries of Nerves*, 1864.

† *St. Thomas Hospital Reports*, 1873, p. 171.

‡ *Am. Jour. Med. Sc.*, 1872.

was bathed in perspiration. The pupils were equal in size and in mobility; the temperature of both sides was the same. The patient died of exhaustion. At the autopsy cancerous masses were found in various parts of the body. A deposit, in the shape of a rounded tumor as large as a small orange, was met with behind the left clavicle, externally to the sternomastoid muscle. The right sympathetic nerve was unusually adherent to the sheath of the vessels and pneumogastric nerve, from a point on a level with the bifurcation of the carotid artery nearly up to the superior sympathetic ganglion. The post-clavicular tumor did not involve the left nerve in any way. To the naked eye the right chain exhibited no middle ganglion, and presented a marked injection of the nerve just above the superior ganglion. The left chain appeared absolutely normal. The microscopic examination of the right superior ganglion showed that the nerve cells alone departed from the healthy standard. This alteration consisted in a marked increase of the granular yellow pigment which normally occupies one-sixth to one-fourth of the body of the ganglion cells. The same appearances were found in the cells of the lower ganglion. Nearly every part of the left chain was examined, and the ganglion cells appeared in precisely the same state as similar elements of the right chain.

If of these four cases we compare with one another the three having a lesion in the neck, we perceive that in two of them it was on the right side, and in the other on the left; in two the pupil of the right eye was contracted and smaller than that of the left, and in the other the pupils were equal; in one case the right side of the head was the hotter, and in the others the temperature of the two sides was the same. In Dr. Ogle's case, after exercise it was the left side that had the higher temperature and sweated, while in Dr. Mitchell's case, under the same conditions, the left side was pale and the right was flushed. In Dr. Seguin's case perspiration appeared only on the left side—the side of the tumor. As to Dr. Payne's case, in which there was no *known* lesion in the neck, the pupil was smaller on the left side, but the vascular congestion was on the right.

We have here a perplexing lack of uniformity in symptoms. In only one of these cases was disease of the sympathetic

actually ascertained. Dr. Seguin thinks that this bore no relation to the one-sided arrest of sweating observed during life, for the abnormal conditions involved both sympathetic nerves, and he remarks that in another case it would be highly desirable to examine the cervical portion of the spinal cord.

We believe that Professor J. Budge* and Dr. Augustus Waller were the first to draw attention to the fact that the dilatation of the pupils is regulated by cerebro-spinal centres through the sympathetic nervous system. They found, by experimenting on the lower animals, that the sympathetic nerve of the iris receives its fibres from two sources. This is not an uncommon occurrence among nerves of the cerebro-spinal system. For instance, the phrenic nerve arises from the third and fourth cervical nerves, and receives a communicating branch from the fifth; it is joined by a filament from the sympathetic, by another derived from the fifth and sixth cervical nerves, and occasionally by one from the union of the descendens noni with the spinal nerves.

The sympathetic nerve is much more complicated than the phrenic, but we have at present only to speak of those fibres which act on the iris. One source called the "inferior cilio-spinal centre" extends from the sixth cervical to the second thoracic nerve. When the spinal cord is irritated in this region the pupils become enlarged; the right side controls the right iris, and the left side the left. If the cervical sympathetic is divided, no enlargement of the pupils takes place when the cord is stimulated. It is thus seen that the cilio-spinal centre responds to irritation, so far as the pupil is concerned, in the same manner as does the cervical sympathetic itself. Brown-Sequard† has repeated those experiments of Budge and Waller, and while arriving at like results, he thinks that the inferior "cilio-spinal centre" extends beyond the second thoracic nerve. He finds that a section of the lateral half of the spinal cord at the level of the fifth and sixth, and even sometimes as low down as the ninth and tenth dorsal vertebræ, affects the

* Budge, *Lehrbuch der speciellen Physiologie*, Leipzig, 1862.

† *Physiol. of the Cent. Nervous System*, 1860.

iris like a section of the sympathetic, though in a less degree.* The other source, called "the superior centre," which is in communication with the upper cervical sympathetic ganglion, is in the medulla oblongata, in the region of the hypoglossal nerve. This nerve communicates with the sympathetic by branches derived from the superior cervical ganglion. If these are divided contraction of the pupil takes place. Brown-Sequard and Schiff have also recognized this centre.

Having seen that the enlargement and contraction of the pupil are influenced by the conditions of these two centres, it is evident that in the four cases which we have noticed the real disease may not have been in the sympathetic nervous system at all. Dr. Mitchell himself recognizes this fact, for he says: "We may believe it possible that in our own case the ball, when passing in front of the vertebræ, caused commotion of the spine in the cilio-spinal track, and so reacted on the eye and face."

Dr. Hughlings Jackson also attaches much importance to this centre in certain lesions of the cervical and thoracic regions. Mr. Paget,† in a clinical lecture delivered at St. Bartholomew's Hospital, presented two cases of severe injury to the arm. In regard to them he said: "The inequality of the pupils is well marked in the man now in the Darker Ward. The pupil on the injured side is always smaller than the other, but they both act equally well, and there is no defect of sight. The same condition has existed ever since the injury in the young lady whose case I related next after his. Her right pupil, corresponding with the paralyzed arm, is always smaller than the left, and there is a very slight appearance, which is said to be increased when she is not in perfect health, as if the right eye were a very little smaller or less open than the left." Dr. Jackson, in remarking on these cases, assumed that the brachial plexus was injured, and suggested that the inequality

* Chauveau (*Jour. de Physiol.*, vol. I., 383,) has found that irritation of the posterior columns in this region of the cord, alone causes pupillary changes, that of the anterior or lateral columns having no influence whatever. The inferior cilio-spinal region, according to this, is therefore to be considered only as a reflex centre, and not as the origin of the pupillary nerves.

† *Med. Times and Gazette*, March, 1864.

of the pupils was due to the relations of this plexus to the cilio-spinal portion of the cord.

At the meeting of the American Neurological Association in June last in this city, a very interesting discussion of this point followed the presentation, by Dr. Putnam, of Boston, of a case of injury done to the brachial plexus by forced extension of the arm.

Our remarks thus far have been confined chiefly to the condition of the pupils in these cases; we have yet to show that the increased circulation, temperature and perspiration do not necessarily imply the presence of disease or lesions of the sympathetic system.

It is, we believe, an established fact, that the calibre of the small arteries is controlled by what are called vaso-motor nerves, and that the blood circulation, the temperature and the perspiration are intimately connected with the condition of the arteries. These vaso-motor nerves are found in the sympathetic nervous system, as is indicated when any of its branches are divided by the increase in temperature of the parts to which they are distributed.

But the vaso-motor filaments are not confined to the branches of the sympathetic: they exist as well in the ordinary cerebro-spinal nerves. Bernard has demonstrated this fact in the most conclusive manner. He divided the fourth, fifth, sixth, seventh and eighth pairs of lumbar nerves on one side in a dog, at the spinal column, and paralyzed motion and sensation in the leg of that side, but the temperature of the two sides remained the same. He afterwards exposed and divided the *sciatic* nerve on that side, and then noted a decided increase of temperature. This experiment, which is only one of a large number, shows conclusively that the ordinary mixed nerves contain vaso-motor fibres, which are entirely independent of the nerves of motion and sensation, a fact which is admitted by all physiologists, and has frequently been illustrated in cases of disease in the human subject.**

Professor Fr. Goltz† and others have repeated these experi-

* *Flint's Physiology of Man*, Vol. IV., p. 439.

† *Schmidt's Jahrb.*, 1875. See also this journal for October, 1874, pp. 469 and 541.

ments of Bernard, with similar results as to temperature and dilatation of the vessels.

Again, it has been conclusively shown that none of the vaso-motor filaments originate in the ganglia of the sympathetic. As early as 1852, Brown-Sequard proved that the "fibres going to the blood-vessels of the various parts of the head come out chiefly from the spinal cord by the roots of the last cervical and the first and second dorsal nerves. Their place of real origin," he thinks, "is partly the spinal cord, partly the higher portion of the encephalon, but chiefly the medulla oblongata and the neighboring parts of the encephalon."

Schiff, Claude Bernard, Brown-Sequard and other physiologists have also shown that the nerves of the blood-vessels in other parts of the body are derived from cerebro-spinal centres.

Now, since it is known that the nerve filaments controlling the circulation, and consequently the temperature and the perspiration of any part, originate in the cerebro-spinal system, it is clear that the seat of disease, in the cases which we have here presented, manifesting these disturbances of the circulation, was not necessarily in the sympathetic system of nerves.

Moreover, these same disturbances of the pupil and of the circulation are not infrequently met with in patients who are supposed to be suffering, not from any disease of the sympathetic, but of the cerebro-spinal centres. Quite a number of cases of epilepsy are reported, which were remarkable for manifesting the above phenomena. It is true that the pathology of epilepsy is not definitely established, yet its most constant symptoms are referable to the functions of the brain, especially of the cerebral ganglia or of the medulla oblongata.

In the *Medical Times and Gazette** Dr. Russell relates "A case of unilateral congestion and sweating occurring in epileptiform paroxysms;" and in the same number of the *Gazette* there is an account of a case of "sweating on one side of the face in a patient who had epileptic fits." Dr. Ram-skill, who had charge of the man, says, "To test the truth of the patient's remark, he had been sent out to walk briskly

* April, 1866.

round the square. On his return, the perspiration was profuse on the right side, and was abruptly limited at the middle line of the nose and lip, but extended very slightly to the left of the middle line of the forehead."

The patient appeared to be healthy, and Dr. Ramskill states that the epileptiform seizures did not differ from those of many other patients in whom this symptom was not present. In this instance there was no evidence of disturbance of the sympathetic by pressure, but the pupils were of unequal size—that on the sweating side was the larger.

Dr. Anstie * reports the case of a boy five years and nine months old, subject to fits from infancy. When seen by the Doctor, no motion of the bowels had taken place for forty-eight hours; "the whole left side of the face and left ear were flushed deep red; the surface was pungently hot, and bedewed with a copious sweat,—the heat and sweating were found to extend over the whole left half of the head, and to cease abruptly at the median line. Before he could leave the room after the Doctor had prescribed for him, he was seized with an epileptiform fit, which lasted twenty minutes." Two hours later he appeared much as usual, except that the unilateral flushing and perspiration, and the feeling of choking were still present. Dr. Anstie thinks that these symptoms were probably produced by paralyzing pressure on the abdominal branches of the sympathetic, but, as he states that there was always a certain amount of weakness of the whole left side, and a considerable tendency to rigidity of the left arm and leg, is it not more probable that the real seat of disease was in the cerebro-spinal system, which may have been disturbed by pressure communicated through the sympathetic filaments?

We will not take time to notice the effects of cerebral meningitis and of lesions of the corpus striatum and optic thalamus on the pupil and the temperature.

Lesions or disturbances of certain cerebral nerves may induce the symptoms which we are specially discussing. It is known, for instance, that irritation of the pneumogastric, in

* *Anstie on Stimulants and Narcotics.*

the upper part of the neck, produces not only pneumonic, cardiac and gastric derangements, but also dilatation of the pupil and heat and tingling of the ear. This nerve is intimately connected with the cervical sympathetic by its two ganglia and its pharyngeal branch.

Physiologists have discovered that section of the fifth nerve causes the iris to contract; and, as it is known that this nerve is also intimately connected with the sympathetic ganglia of the head, it is very natural to infer that the fibres acting on the iris pass through it.

The trifacial must, consequently, be added to the pneumogastric, as one that may, through its disease, induce abnormal conditions of the pupil.

Further, Notta * has noticed quite a number of cases of unilateral redness of the face, and unilateral sweating, due to trigeminal neuralgia.

There is another nerve, which, in certain conditions, may mislead us, viz.: the third nerve. In its action on the iris it is antagonistic to the sympathetic; it controls the circular fibres which lessen the size of the pupil. When this nerve is divided or paralyzed, the pupil enlarges, but when it is simply irritated, contraction takes place. Hence, a case of contracted pupil, supposed to be due to a lesion of the sympathetic nerve, may in reality be caused by diseased irritation of the third nerve.

Again, there may be unilateral contraction of the pupil through reflex action, one retina being more sensitive to light than the other; and it is very probable that, in certain cases, the light acts *directly* on the muscular fibres of the iris, causing contraction of the pupil, as it does after death. Brown-Sequard has observed that this is not necessarily the result of reflex action, for it can be induced after the removal of the posterior half of the eye-ball.

We may mention before passing to another point in this paper, that we have met with persons in whom the pupil could be contracted at will. We can hardly believe that this control was direct, but rather that it resulted from the adjustment of the vision to near or distant objects.

* Dr. A. Notta, *Arch. Gen. de Méd.*, 1854.

GRAVES' DISEASE.

We come now to consider other disturbances or diseases which have been attributed specially to lesions of the sympathetic system.

Exophthalmic goitre or Graves' disease is believed by many to belong to this class. It occurs chiefly among anæmic females, and is usually characterized by hypertrophy of the thyroid body and great prominence of the eyeballs. Some have attributed the latter symptom to the pressure of the goitre on the cervical sympathetic, but sometimes both symptoms are developed together, and often the glandular swelling follows the exophthalmos.

Trousseau,* among others, believes that exophthalmic goitre is always due to actual disease of the cervical sympathetic; but the experiments of physiologists make it difficult to accept this solution. Section of the cervical sympathetic causes enlargements of the blood-vessels, which might account for the increase in size of the thyroid body, but the reverse of exophthalmos is produced. Irritation, simply, of the cervical sympathetic, causes contraction of the vessels and prominence of the eyeballs.

Can this difficulty be overcome by supposing that certain nerve fibres are in a state of irritation, and others so diseased as to be inactive?

If exophthalmic goitre is a disease of the cervical sympathetic, it is remarkable that in no case is the pupil disturbed.

Trousseau, Lancereaux, Beveridge, Recklingshausen, Virchow and others have reported post-mortem examinations which they made of cases of Basedow's disease. In some they found the cervical sympathetic much enlarged, in others almost obliterated or supplanted by cellular and adipose tissue; and they met with cases where granular matter had, in a great measure, taken the place of cells and nerve threads, and the connective tissue was greatly increased.

On the other hand, Geigel† found no microscopic changes in the cervical sympathetic, though both chains were wound

* *Gaz. Med.*, 1862, p. 453.

† *Functional Nervous Disorders*, by Dr. C. H. Jones, p. 659.

round with a thick connective tissue sheath; but there were decided changes in the spinal cord. In two cases examined, one by Ranvier and the other by Paul,* no microscopic changes were found in the sympathetic system.

It is remarkable that ordinary endemic goitre is not accompanied with exophthalmos.

The above facts suggest that the starting-point of the disturbances which characterize this disease may be in the cerebro spinal system.

PROGRESSIVE MUSCULAR ATROPHY.

Althaus, Jaccoud and others, treat progressive muscular atrophy as primarily a disease of the sympathetic system. Jaccoud,† in two cases which he examined, found atrophy of the anterior roots of the spinal nerves of the neck and of the three or four upper thoracic nerves, but he was not able to detect any change in the spinal cord. The cervical sympathetic, however, was enveloped in an old fibrous sheath containing fatty layers, and there was extensive fatty degeneration of the sympathetic nerve and cell matter.

In passing we would note that no exophthalmos is spoken of in connection with these sympathetic lesions, though Lockhart Clarke and others have recorded cases in which there was contraction of the pupils.

Schneevoigt‡ reports a case in which the lesions of the sympathetic system were much the same as those in Jaccoud's cases, but he found the spinal cord from the fifth cervical to the second thoracic nerves remarkably soft, having undergone fatty and granular degeneration. This observer holds that the disease begins in the spinal cord. Several cases are published where the relation between the muscular atrophy and the lesion of the anterior horns has been demonstrated.§

Dr. Roberts,|| though finding the spinal cord diseased in four out of the thirteen cases which he examined, contends

* *Berliner Klinische Wochenschrift*, 1865, No. 27.

† *Leçons de Clinique Médicale*, p. 361.

‡ *Schmidt's Jahrb.*, 1855, Heft 8.

§ *The Medical Record*, Oct. 16th, p. 694.

|| *An Essay on Wasting Palsy*, London, 1858.

that the muscles are the parts first attacked; and he is by no means alone in this view, as it has also the weight of the authority of Friedreich, the writer who, of all others, has done the most to throw light on some points of this disease.

Whatever we may conclude in regard to wasting palsy, it certainly is not yet clear what *rôle* the sympathetic plays in this disease.

PROGRESSIVE ATAXIA.

In progressive ataxia there are symptoms which seem to indicate that the sympathetic system is more or less involved.

In most cases there is at some time contraction of one or both pupils, and an increase in the vascularity and temperature of one or both eyes; and in some, unilateral sweating has been noticed during a pain-spell.

These phenomena have led Duchenne* to believe that the sympathetic system is the starting-point of this disease in many cases; and since there is but one recorded case in which lesions of the cervical sympathetic were found, he infers that in some way this part of the nervous system is *functionally* disturbed first, and reacts on the posterior columns of the cord and causes their atrophy. From what we have already shown, may not the reaction be the other way, *i. e.*, so as to disturb the function of the sympathetic through disease of the cerebro-spinal centres and nerves?

Voisin† points out that Luys has found the spinal ganglia enlarged and congested, and thinks this condition would influence the sympathetic with which they are connected.

HEMICRANIA.

Is hemicrania essentially a disease of the sympathetic system? Du Bois Reymond‡ and Moellendorf think that it is, though they take opposite views as to the nature and the effects of the disturbance of this system of nerves. The former, who has studied his own case closely, says that hemicrania is a "tetanus of the muscles of the blood-vessels of the

* *Gaz. Heb.*, 1864.

† *Gaz. Heb.*, 1864.

‡ *Archiv fuer Anatom. und Phys.*, 1860.

affected side of the head, or a tetanus in the region of the cervical portion of the sympathetic, the pain being caused by the extreme contraction of the muscles." In his case there was enlargement of the pupil of the affected side.

Moellendorf* takes just the opposite view, and says the vasomotor nerves lack in energy, and consequently there is increased arterial flow. He found that hemicrania was relieved by compression of the carotid of the suffering side of the head, and increased by compression of the other carotid.

Anstie† and Lebert are of the opinion that the anatomical seat of this disease is in the first branch of the fifth nerve. The former who, like Du Bois Reymond, has studied his own case, says he has noticed that sick headache most frequently occurs in patients among whose ancestors epilepsy has made its appearance. He thinks there is high probability that the essential groundwork of the migrainous disposition is an inherited imperfect organization of larger or smaller tracts of the medulla oblongata, and that it is a matter of what we may call accident whether the breakdown of nervous health takes the form of migraine, or of epilepsy, or of some other affection.

Romberg‡ holds that the seat of the disturbance is in the brain, and calls this disease neuralgia cerebialis.

ADDISON'S DISEASE.

The marked feature in Addison's disease is a peculiar uniform discoloration of the skin, which becomes of a brownish olive green hue. In most cases which have been examined, an abnormal condition of the suprarenal capsules has been found. By some these have been believed to be the starting-points of the disease; but Addison and others, more recently, have held that the solar plexus was primarily affected, the bronzing and capsular lesions being consequent or secondary, for they frequently met with atrophy or other changes of this part of the abdominal sympathetic.

* *Archiv fuer path. Anatom.*, 1867.

† *Braithwaite*, 1873, vol. I.

‡ *Archiv fuer Anatom.*, 1860.

With as much reason Oppolzer,* among others, asserts that the sympathetic lesions are not primary, for they are often absent in well marked cases of this disease.

It is even doubtful whether the solar plexus, or the renal capsules, have anything to do with originating the constitutional disturbances which characterize it, especially when we recall the experiments of physiologists on these parts. Rats, cats and dogs have continued healthy long after the removal of the capsules and the solar plexus. Schiff found that some of these animals even grew fatter after the extirpation of the semilunar ganglia.

LEAD COLIC.

There are various views held in regard to lead colic. Some ascribe it to local disturbances in the intestines; others assert that the spinal cord is the primary seat of the disease; some believe that the abdominal sympathetic is first attacked, while others hold that the spinal cord and sympathetic system are at the same time involved.

The diversity of opinion is not lessened by the statements that quite a number of cases are recorded in which there was no disease of the sympathetic; and also quite a number in which there were no morbid appearances of any kind to be found.

The full bearing of lesions of the abdominal sympathetic in cases of lead colic must for the present remain unsettled.

It will be seen by this rapid review that we have failed to discover a single disease, which, beyond question, has for its basis or starting-point the sympathetic nervous system; and that the symptoms attending lesions of this part of the animal structure are not readily distinguishable from symptoms resulting from disturbances in certain portions of the cerebro-spinal system.

With these facts before us it will also be readily seen that the determination of the effects of alcohol on the ganglionic nervous system is attended with many difficulties.

We are fully aware that in these notes we have not given due weight to the more recent observations of certain well-known physiologists and pathologists, and our only excuse is that our object has been chiefly of a suggestive nature.

* Oppolzer, *Wiener med. Wochenschrift*, 1866, No. 81.

